

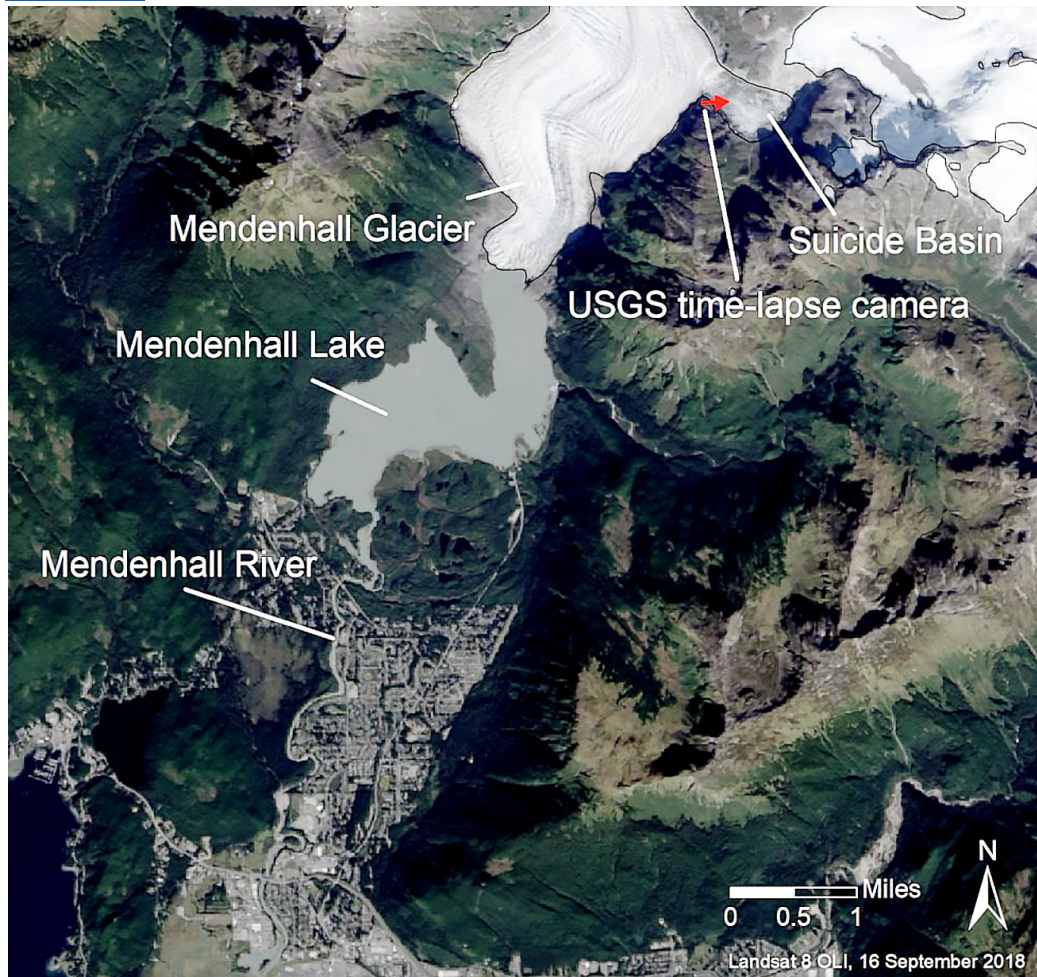
Times Standard

Not My Fault: Glacial floods, not just a threat in Iceland

Lori Dengler for the Times-Standard

Posted August 12, 2023

<https://www.times-standard.com/2023/08/12/lori-dengler-glacial-floods-are-not-just-a-threat-in-iceland/>



Google map of Mendenhall Glacier, location of the USGS monitoring camera, and the area north of Juneau's airport where the August 5 – 7 jökulhlaup occurred.

Barely had I typed the word jökulhlaup for last week's column than we had one. On August 5th, a flood on the Mendenhall River near Juneau, Alaska swept away a home and exceeded its previous maximum height by two feet.

A jökulhlaup is any flood triggered by glacial melt waters. They are common in Iceland because glacial melting gets an added boost from the many volcanoes beneath the country's glaciers. But they occur anywhere in the world where glacial melt waters collect and unpredictably burst out.

Often called a GLOF (glacial lake outburst flood) instead of the harder to pronounce Icelandic term, the Mendenhall River is well known for annual glacial melt water flooding. Fed by waters from Mendenhall glacier, the USGS and Alaska agencies have been closely monitoring the glacial lake, river, and its flood potential for decades. The area has earned the nickname “Suicide Basin” for its floating icebergs and regularly recurring floods.

But this year the flooding was bigger. The river began a rapid rise on the morning of August 5th as nearly all the water in Suicide Basin burst out of its ice containment walls. Water levels at the Mendenhall River gauge rose eight feet in 24 hours, the highest ever recorded since monitoring began. Juneau officials ordered evacuations and declared a local emergency. The high flow eroded riverbanks downstream, destroying a house, trees, and other structures. Flood waters also damaged fuel tanks and hazardous material containment. No injuries were reported.

There are a number of glaciers in Alaska that exhibit regular glacial outbursts. During the winter melting in minimal and glacial movement creates new ice dams that block the summer ice melt until the combination of melt and pressure bursts the temporary dams. This process can repeat for decades even as the glacier recedes.

The Mendenhall jökulhlaup is just a preview of what will be increasingly common in the next decades as glacial melting accelerates and ever greater amounts of water accumulate beneath, within, and on top of glaciers. There were no injuries in Juneau last week and most of Alaska’s glaciers and glacial lakes are in areas remote from population. But a larger outburst in the future would pose bigger problems.

In the global hazard picture, jökulhlaups pose a far greater threat to human populations in Asia in regions below the many melting Himalayan glaciers. Tibet, Nepal, India, Pakistan, and Bhutan have all experienced glacial floods in the past and the frequency has increased recently. Communities in Peru and Chile downslope of Andean glaciers are also at risk.

Jökulhlaups are just one more consequence of a warming world. An arguably bigger threat to Alaska is hillslope instability as the glaciers retreat. All of Alaska’s glaciers are in retreat and the great valleys that the ice carved out are now exposed and no longer supported by the tons of ice that once filled them. Small landslides have become more common and large cracks are appearing in some areas, a sign that larger failures may be imminent.

Much of Alaska is remote and landslides are unlikely to be of much human consequence. But there is one area that I call a red alert. The Barry Arm fjord in Southern Alaska is only 30 miles away from the town of Whittier and a series of fractures have been observed in the steep rock walls no exposed by the retreating ice.

A large landslide in Barry Arm could produce a tsunami akin to the 1958 Lituya Bay tsunami, the highest ever recorded. Like Barry Arm, Lituya Bay is a long, deep, narrow fjord. There are three instances in historic times where landslides at the head of the fjord tumbled into the water producing large tsunamis, the largest in 1958 reached over 1,700 feet.

It is unlikely that a Barry Arm landslide would trigger a tsunami anywhere near as large as 1958, but it could pose a greater threat to human life. There are no towns in Lituya Bay. The only people at risk are those in fishing boats. Once the tsunami exits the narrow fjord, it quickly

diminishes in size. The town of Whittier, Alaska is positioned across from the mouth of the Barry Arm and only 30 miles from the threatened landslide area.

We've been aware of the tsunami threat posed by landslides for many decades. Concerns about Barry were first reported in 2020 and since then, the State of Alaska, the USGS, and the National Tsunami Warning Center have worked to better define the risk and develop warning systems. Two seismometers, an infrasound array to detect landslide sounds, ground-based radar, weather stations, cameras, and water level recorders are all in place.

The big push now is outreach, education and improving evacuation routes. Residents of Whittier could have as little as 10 minutes between detection of a tsunami and its arrival, a similar time window to all of us living on California's North Coast from a great Cascadia earthquake. Whittier, like the North Coast, also has the challenge of educating tourists who aren't aware of the threat or how to quickly get to high ground.

There was no threat of flooding, landslides, or tsunamis in the recent eruption in Iceland. The Reykjanes Peninsula has been ice free for over 10,000 years. That eruption now appears to be over. Litli-Hrútur, the small rift that greeted us with a plume of gasses when we landed in Iceland on July 11th, gave its last small puff a week ago. Seismic tremor has ceased, and earthquake activity is slowly returning to pre-eruption levels.

It was the perfect tourist eruption, never large enough to threaten populated areas or even delay flights from Iceland's main airport only 14 miles away. Officials restricted access to the area near the vent over concerns of toxic gasses, but tens of thousands have hiked to viewpoints or took helicopter rides during the 25-day eruption.

While active venting has stopped, it is likely only a pause in the evolution of the volcanic system on the Reykjanes Peninsula that popped back to life in 2021 after more than 800 years of quiescence. Volcanologists in Iceland caution it is not over and expect similar outbursts in the coming year.

Note: see <https://mashable.com/article/glacier-outburst-mendenhall-alaska> for video footage of the glacial outwash flooding near Juneau.

Lori Dengler is an emeritus professor of geology at Humboldt State University, an expert in tsunami and earthquake hazards. The opinions expressed are hers and not the Times-Standard's. All Not My Fault columns are archived online at <https://kamome.humboldt.edu/taxonomy/term/5> and may be reused for educational purposes. Leave a message at (707) 826-6019 or email Kamome@humboldt.edu for questions and comments about this column. Downloadable copies of the North Coast preparedness magazine "Living on Shaky Ground" are posted at <https://rctwg.humboldt.edu/prepare/shaky-ground>.